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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,758	06/27/2003	Dwayne M. Perry	4726-013	7178

24112 7590 04/11/2007

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EXAMINER	
DEB, ANJAN K	
ART UNIT	PAPER NUMBER
2858	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/11/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/608,758	PERRY, DWAYNE M.	
	Examiner	Art Unit	
	Anjan K. Deb	2858	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 June 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's election of claims 7-19 and canceling claims 1-6 in the reply filed on 02/06/2007 is acknowledged.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 7-10 and 15, are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (US 6,216,056 B1) in view of Herring (US 6,373,262 B1.)

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Re claims 7 and 15, Ito et al. discloses force/torque (FT) sensor 4 (Fig. 2), comprising sensor housing (body) at least one transducer (gauge) within said sensor housing operative to convert an applied force or torque to a transducer electrical signal electronics operative to convert said transducer electrical signal to a force/torque signal (output signal) suitable for reception by a data acquisition system 11,12 and memory (inherent to processing unit 12) for storing digital calibration (column 6 line 20) data associated with said sensor. Re claim 15, Oti

disclosed data acquisition system 11,12 attached to a conductor and operative to receive force/torque signal and calibration data as analog inputs (column 6 lines 9-21).

While Ito et al. disclosed FT sensor 4 transmits analog (column 6 line 10) signal by conductor to amplifier 11 (as seen in Fig. 2) it did not expressly disclose that the signal is transmitted on a multi-conductor cable.

Herring disclosed multi-conductor cable 107 (twisted pair/dual conductor) for transmitting analog and digital signal (column 1 lines 45-49)(Fig. 1).

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Ito et al. by adding multi-conductor cable disclosed by Herring for transmitting analog and digital signal from a sensor.

Re claim 8, Ito et al. did not expressly disclose sensor electronics 11, and memory 12 (inherent to FT sensor signal processing) reside within sensor housing but would have been obvious to do so for making an integrated sensing unit [see MPEP 2144.04. V: Making Integral.

> In re Larson, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965) (A claim to a fluid transporting vehicle was rejected as obvious over a prior art reference which differed from the prior art in claiming a brake drum integral with a clamping means, whereas the brake disc and clamp of the prior art comprise several parts rigidly secured together as a single unit. The court affirmed the rejection holding, among other reasons, "that the use of a one piece construction instead of the structure disclosed in [the prior art] would be merely a matter of obvious engineering choice.")

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Ito et al. by adding sensor electronics and memory within sensor housing as a matter of obvious engineering choice for making an integrated sensing unit

Re claims 9, 10, Ito et al. disclosed FT sensor and electronics 11,12 (Fig. 2) operative to transmit force/torque signal in analog format through a cable and calibrating (column 6 line 20) sensor output.

Ito et al. did not disclose transmitting digital calibration data as a digital bit stream on another channel of said multi-conductor cable and force/torque signal and said calibration data are transmitted as differential pairs.

Herring disclosed differential signal transmission comprising digital bit stream (binary) data through multi-conductor cable (dual conductor transmission lines) and disclosed that differential signaling has the advantages that it is less prone to common mode noise (column 1 lines 45-49)(Fig. 1).

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Ito et al. by adding differential signal transmission comprising digital bit stream data through multi-conductor cable disclosed by Herring to reduce common mode noise.

4. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (US 6,216,056 B1) and Herring (US 6,373,262 B1) in view of Grahn et al. (US 4,704,909 A).

Re claims 11 and 12, Oti disclosed memory (inherent to processing unit), however Oti as modified by Herring did not disclose FT sensor comprising a power supply in a power supply

housing, separate from said sensor housing, said power supply operative to supply power to said FT sensor.

Grahn et al. discloses multicomponent force-torque sensor including power supply (V) separate from sensor housing (Fig. 3).

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Ito et al. and Herring by adding power supply disclosed by Grahn et al. to supply power to FT sensor electronics.

5. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (US 6,216,056 B1), Herring (US 6,373,262 B1) and Grahn et al. (US 4,704,909 A) in view of Schuh et al. (US 2003/0065467 A1).

Re claims 13 and 14, Ito et al. as modified by Herring and Grahn et al. disclosed all of the claimed limitations as set forth above except to transmit digital calibration data as a digital bit stream on another channel of multi-conductor cable.

Schuh et al. disclosed data acquisition system (30,75,40) for smart sensor 20 attached to multi-conductor cable (50,51,52) and data communications port 75 also attached to said multi-conductor cable operative to receive sensor signal 50 and calibration data 52 (characterizing data) (Fig. 1,2). Signals 51, 52 disclosed by Schuh (Fig. 2) are broadly interpreted as transmitting digital calibration data as a digital bit stream on another channel of multi-conductor cable (50,51,52) as required for communication between memory 70 and μP 120.

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Ito et al., Herring and Grahn et al. by transmitting digital calibration data as

a digital bit stream on another channel of multi-conductor cable disclosed by Schuh et al. for communication of calibration data stored in sensor memory to a microprocessor for accurately measuring and display of sensor output.

6. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (US 6,216,056 B1) and Herring (US 6,373,262 B1) in view of Schuh et al. (US 2003/0065467 A1).

Re claims 16 and 17, Oti as modified by Herring did not expressly disclose data acquisition system interprets calibration data as a digital bit stream.

Schuh et al. disclosed data acquisition system (30,75,40) for smart sensor 20 attached to multi-conductor cable (50,51,52) and data communications port 75 also attached to said multi-conductor cable operative to receive sensor signal 50 and calibration data 52 (characterizing data) (Fig. 1,2). Signals 51, 52 disclosed by Schuh (Fig. 2) are broadly interpreted as transmitting digital calibration data as a digital bit stream on another channel of multi-conductor cable (50,51,52) as required for communication between memory 70 and μP 120.

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Ito et al. and Herring by transmitting digital calibration data as a digital bit stream on another channel of multi-conductor cable disclosed by Schuh et al. for communication of calibration data stored in sensor memory to a microprocessor for accurately measuring and display of sensor output.

7. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (US 6,216,056 B1), Herring (US 6,373,262 B1) and Schuh et al. (US 2003/0065467 A1) in view of Kuwahara (US 4,833,624 A).

Re claims 18 and 19, Ito et al. as modified by Herring and Schuh et al. disclosed all of the claimed limitations as set forth above except that data communications port complies with the EIA RS-232 standard and differential lines of multi-conductor cable carrying calibration data are connected to receive data and signal ground connectors of said data connection ports.

Kuwahara disclosed RS 232 communication ports for force/torque sensor data communication in a robot control system. Data and signal ground connectors are inherent to data connection ports disclosed by Kuwahara (column 4 line 61).

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify the combination system of Ito et al., Herring and Schuh et al. by adding RS-232 communication ports disclosed by Kuwahara for providing a standard system of communication with I/O controllers and by adding differential lines of multi-conductor cable carrying calibration data are connected to the receive data and signal ground connectors of said data connection ports since Herring disclosed that differential signaling is beneficial to reduce signal noise.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kawagoe (US 5,712,563 A) discloses torque sensor 61 comprising electronics 60 with power supply 15 and housing.

Giovinazzo (US 4,320,392 A) discloses force/torque transducer in housing 1 (Fig. 1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Anjan K. Deb whose telephone number is 571-272-2228. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew H. Hirshfeld can be reached at (571) 272-2168.

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Art Unit: 2858
4/3/07